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THE

Great Water Problem

ALSO

Results of a Late Survey from Knight's Landing
to Upper End of Canal made by the old
Swamp Land Commission.

Compliments of

L. F. Moulton.

Colusa, April 15, 1904.

COLLEGE
STATE

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BY L. E. MOULTON.

COLUSA, JANUARY 26, 1895

THE GREAT WATER PROBLEM

Surveyor-General Hughton said to me that he had read my pamphlets, and heard my lectures and talks on the great water problem, and that I would die with the belief that when an immense, warm rain fell on a great amount of soft snow, it would take the whole width of the valley to contain the flood. While reclaiming the throat of 30,000 square miles of water drainage, I *reversed* all former levee systems, and made drains and canals through the tules, with wagon roads for levees, so that the flood could pass above them, and so that the canals could drain the land ready for the plow, instead of holding the floods back by big levees. And the great and wise ones were about to send me to the insane asylum for this crazy innovation that proved such a grand success in reclaiming tule waste.

The same, with slight variation, can be applied to higher lands when only slightly overflowed. Water runs in the lowest swags, keeping the deeper center clear, but building the shallower and slower side currents up to, and even above, the surrounding surface, thus making for themselves a high-ridge slough, higher than the former high ground, and so leaving a swag between such high-ridge sloughs. To make these lands habitable: Take a New Era Grader, with horses attached, and throw dirt out of inside edge of slough upon the bank, making slough wider, and so forming a

wagon road from one to four feet high, with gates in both head and lower cross levees, and making a safe, cheap, hollow mound, easily flooded when desired, and suitable for small farm homes. This winter flooding partly takes the place of irrigation, and can be pumped nearly as cheap as if running in ditches. I predicted that the weight of water would be used for manufacturing purposes at foot of mountains, as in the Lowell factories. I little thought that lightning would bring it to use for pumping and manufacturing, utilizing all water running to waste. During every flood for a half century, I have gone down on the flood waters to tide water. I have been down on two floods this winter.

Billy Guin and other capitalists sent me down to Grand Island to reclaim it. I reported that I feared it too big a job to stop up the outflow to the sea; part of the way the land would float in water. Now the old river dwellers have only to use the miners' debris to build up their levees high enough to double the fall and velocity of the current, at a cost of four cents a yard; so that the former break at Paine, the water being able to reach the tide quickly, would be much better than a break at Edwards, in which case the water would run south over valuable homes, and, hurrying on down the rivers to the south, would inundate the rich lands in its course to the sea.

On each side of the overfall into Yolo Basin Canal at Paine there should be high levees into the main canal, with the dirt thrown mostly to the south, thus reclaiming a large district on the south side of the canal, the water running to Prospect Slough and through tide gates to Cash Slough, so that these tide gates would pump out the floods

above twice every twenty-four hours, leaving a reservoir for future flood.

After three years, I got Captain Eads to come to this state. He said: "You must first stop putting debris into your rivers, or the levees will do no good, as the beds of the streams will rise too fast for the farmers."

Experience has demonstrated the correctness of his assertion. The *debris*-impounding-dam advocates have made most horrible failures, and it is only charitable to believe that they were not such incompetents as they claimed to be. Captain Eads gave me his idea as to how to handle those dams, but it would be offensive to quote them in comparison with the present engineering failures. However, I would suggest a deep wire to turn the debris out on the poor land, and allow it to settle; then run it over concrete to the river below, thus preventing the destruction of the rivers and farms in the valleys below; this would leave clear water to scour out the river channels, and thereby help the miner.

That greatest of engineers on this coast, said that he had been charged with recommending rubble, meaning two-pound stone, on this sixty feet of sand,—actually ninety feet, with big boulders below,—but, instead, was in favor of putting on ten and twenty-ton stone. I replied, "Yes, water running over would dig its grave, and the dam would fall into the grave."

These restraining-dam humbugs will give way when full, or before, like the dam at Cumington, and the escaping water will drown all in its course, and ruin their lands and homes.

Rans. Carey headed a petition to have me appointed Commissioner of Public Works. Most of

the members of both the House and Senate, also the Supreme Court judges, land men, and others, signed it. Had I accepted the position, I could have made this state worth hundreds of millions more than have the "*divy*" robberies and political pulls, which make our present disasters a laughing-stock of *actual engineers*.

I offered to take one-half of the 300,000 acres of land when I had proved it reclaimable for late crops. They replied that the State Commissioners would do it for them, and that a bill for \$700,000 would be (and was) offered for that purpose. I had behind me the biggest bankers in the state.

A supreme judge said that if my bill—to cut through ridges, so letting water go on to the sea—had not been defeated, he would have been saved his vast landed property, as my proposed canal would have strengthened his levees and have made a drain for levee breaks and seepage water.

District 108 is now carrying out, as far as their land extends, my canal plans, which, though incomplete, are forcing hill water to run over into Fare's pen. I suggested to Fare that he buy a strip across Knights Landing wide enough to remove opposition to cutting through the ridge, and so letting 50,000 acres down *slowly* onto 400,000 acres, which would not increase the height, as the lower end *rested* against the *tide*. With secure, double tide gates at Prospect Slough (a three-mile slough out of Cache Slough), this would make the tide a vast pump to pump out the waters above twice in every twenty-four hours, and not allow the tide to flow back, as now.

Mr. Egbert and myself made a survey across the Montezuma Hills, but found our hope to free the floods impracticable. On advising with Colonel

Mendall, an ex-senator, said, "We need a cut through the Montezuma Hills." Colonel Mendall replied, "I don't think so," and a sharp controversy was on. I asked permission of the colonel to answer, and I answered in the language of a supreme justice, who said: "Are you not running into Montezuma Slough, which is another arm of the same sea level, which is running in the wrong direction?" It would be vastly cheaper to widen, deepen, and straighten the *sandy* river bed, dredge out the sand, and raise levees high enough above the present five-foot fall from Sacramento to secure, say, a ten-foot fall to tide water, thus taking but one-third the time to pass the floods, at the same time securing increased velocity to scour out the bottom of the river.

The theory of the Italian engineers was to concentrate; so was it of Eads at the mouth of the Mississippi jetties. He put mattresses on the bottom of the larger two outlets, and dredged and loosened the dirt in the smaller outlet, so that the Great Eastern did come in; and, with jetties to the deep ocean water, achieved his greatest glory.

To review this little pamphlet, written at different times, conditions being about the same, no important changes seem necessary. With honest engineering in carrying out the sensible legislation which *will* be passed at the coming legislature, the canals will be opened out, to accelerate the flood's flowing to the sea, instead of being left as pens to hold the water back.

This winter's flood will convince all fair-minded, clear-headed persons that my plans must be carried out. Most of the people have come around to my theories, and some are enthusiastically furthering them as their own inventions. The more of such

the better it will be. I, having sold my land, can have no other than a common interest for the good of all.

I have a map, attached to the back cover, which shows some small overfall canals to the main canal, also a cut-off below Knight's to Feather River.

I have been accused of working against the miners unfairly. To this I plead guilty of trying *fairly* to save the great waterways of this golden sunset West. Our great navy needs deep channels through which to reach the dry dock for repairs; and our merchant marine needs them, in order to return to us the priceless treasures of our new possessions in the Far East. I have never unfairly worked against our great partners, the worthy miners. John Crouch, one of the largest farmers in California, and Colonel Chas. Fred Crocker and myself had a suit against the great Cherokee Mine, in Butte County. I, as manager of this suit, allowed them to run until they stopped of their own accord; and later they started up again, and were allowed to run on without molestation, until they again stopped of their own accord, after the mine was entirely worked out.

I ask all receiving this little pamphlet to study and improve it, and be prepared to assist in securing legislation.

Respectfully,

April 15, 1904.

L. F. Moulton.

COLUSA, Jan. 26, 1895.

On Tuesday, January 22, I was between a great flood of waters at Williams; on the next day, Wednesday, I went by team to Dunnigan; the next day, Thursday, by team to Woodland and by cars to

Sacramento; and Friday I went down the river on a boat to San Francisco, thus following the great flood and its effects to the ocean. I did this to again review my writings and theories of more than a third of a century, and found them correct.

At the last session of the legislature, two bills were formulated, one for drainage and one to create a body as Commissioners of Public Works. An experienced lobbyist, at \$10 per day, was employed to pass the same, but two days before the close I found that he was unable to pass them. I asked unanimous consent, and passed the Commissioners Bill, as I thought it best to get some order out of the vast expense of the engineers' office. It was understood that a report, together with recommendations, should be printed in the press months before this legislature should convene, and that a law was to be printed to be discussed especially by the land owners. At that time the session was nearly over, and no bills, or no settled plan of bill, or boundaries of bill, or kind of bill, had as yet been presented to the land owners or to the legislature for discussion. The engineers' report is burdened with about one-half its weight with unnecessary maps, instead of a small, handy, necessary map to clear up the foggy mass of former reports of the State Engineers' office. They, in their report, claim that some eighteen million dollars have been divided by this, yes, by part of this gang of great drainers, and ask to be now continued in this costly business to the taxpayer, which, by the present rumored skeleton of a bill, will not give the taxpayers any say about their own affairs. The Commissioners' report is in favor of a canal to catch the foothill waters of the Colusa Basin and carry them around the edge of the basin to the top of

the ridge at Knights Landing, and then over the ridge to Yolo Basin, or across a full river onto a full Sutter Basin to evaporate, instead of letting them through the ridge, and down a fall of fifty-seven feet from the upper end of upper pond at Colusa Railroad, to the state datum. There should be stop gates in all ridges, to prevent back flow of water into the upper ponds, also there should be tide gates at the junction of Prospect and of Cache Slough with the Sacramento River, at least as wide as the river itself. This would stop *back flow of tide* into the 400,000 acres above the basis, thus effectually pumping off five feet, or nearly the entire pond, and draining even the lowest lake above, and stopping tide at all seasons of the year from going back up into basin. Add my pen theory, and, at slight cost, everything possible will be well done.

Having failed to get others to agree with the overfall or outlet theory of mine, and having an abundance of drainage down into Sutter Basin, I have let above Princeton, on east side, a 350-foot outflow through the levee, also at Colusa 500 feet more, which was ample for the last flood, but the water itself made one break at Butte City on east side, and two on the west bank, opposite Butte City, which, if left unfilled, would be ample outlet to as far down as to between Colusa and Princeton.

The canal by pass recommended in the Commissioners' report on Butte Basin—on the east side of Sacramento River—would be a catch for levee breaks, rain water, and seepage, and would be expensive to prevent wave wash, etc. This strip of land, being already levied and well drained, it would be unjust to include it in a district.

The water which escapes through the levee out-

lets on the east bank of the river, together with that of the creeks and rivers, all runs into Butte Basin, having an escape through about a one-fourth-mile funnel, between Butte and Swamp-Land District Levee No. 70, and runs rapidly down into the deep Sutter Basin below.

The Commissioners' report proposes to hold up this rapid flow out to Sutter Basin and carry it around the higher edge, some twenty feet above the bottom of the basin, then around this nearly level edge of basin to and *over* the high-flood waters of the Sacramento and of the Feather at their confluence (*instead of piping under the Sacramento River*), and over into the Yolo Basin *main canal*. This holding up of water in a nearly level canal would obstruct the water's outlet and *dam back* the waters, as at Park's Dam, for many miles above, and would be a positive injury, instead of benefit, to lands *taxed* for the *benefits*.

This I can prevent, as I have an injunction from the Supreme Court against ponding back waters, which will prevent this arbitrary execution of despotic power of Commissioners and legislature in attempting to destroy vested rights by taxing the owners of land to pay for this free bootery, which is enjoined by the Supreme Court in Moulton vs. Parks.

L. F. Moulton.

The Survey.

In the extension of the old State Swamp-Land Commissioners' canal up to and through Knights Landing to lower Sycamore Slough, my survey across the Knights Landing ridge of Feb. 23, 1873, which was again examined and extended down to the upper end of the old State Swamp-Land Commissioners' canal, at end of Cache Creek, which canal has filled with *debris* six feet, was finished Nov. 15, 1890. My first datum was, and now is, on the root of a three-foot cottonwood tree near the south end of Indian Mound, it being only two inches different from highest water in river, and I call it the same to avoid confusion. From D and highest river water mark, I ran south about three hundred yards, to railroad, and found a six-and-one-half-foot *fall* between high water on Feb. 23, 1873, at upper pond, and high water *at that date* in lower pond, but a *strong south* wind raises the water four feet higher on south side; and a *strong north* wind in 1880 raised upper pond about four feet higher, but it receded to above-named datum on wind stopping. And the upper pond ran over ridge, with destructive violence, down across Knights Landing ridge in 1852-3, in 1861-2, in 1877-8, and in 1880-1.

Last winter, there being no very heavy *north* gale, and only hill water above, it did not run over a small levee built at cottonwood tree D, but did, for a short time, blow up from the south to within two feet of tree D from the south pond; but, as south pond is *resting against tide*, it soon

receded to six-and-one-half-foot fall in one-fourth mile across the ridge, consequently I again adopted my former *fair-weather* datum of 1873, and again found six-and-one-half-foot fall in one-fourth mile between *upper* and *lower ponds* in fair weather in ordinarily high floods.

The time of my last survey was on Nov. 15, 1890. The water in both the lower Sycamore Slough and river was fifteen feet below my D on cottonwood, all the land outside of the lake in *upper* basin being uncovered. This makes it just fifteen feet at south end of the deep slough near datum, and it is only necessary to cut through the ridge fifteen feet to drain all the land above. This depth we can get by opening out and widening the old state swamp-land canal a short distance on the upper end (it being about five miles south of Landing). Of course, if lower state canal be deepened, its fall below being very rapid, it will give more fall than is necessary to drain the upper basin.

I did not run down through the lowest trough, as it was necessary to keep on *higher* land, in order to get enough and better earth to make high embankments west of Judge Garute's sugar, cotton, and rice plantation, which could be spring flooded in growing season from the river, and then could be let out through pipes into lower canal, and on down to the lower end of lower pond at Cache Slough and to tide water, thus getting cheaply through the ridge at Knights Landing, of only fifteen feet. Notwithstanding this slight and only obstruction, together with inflow of waters, the upper end of upper pond at Colusa Railroad grade is fifty-seven feet above state datum.

To summarize generally: The fall of the ground

from Colusa Railroad to low tide is fifty-seven feet, with fifteen-foot ridge at Knights Landing. At Harlem Lake, Holland, fourteen miles long, it makes three feet of difference whether wind blows from the south or the north. There they pump 44,000 acres, sixteen and one-half feet below the level of the sea; here the "*land owners*" should cut a canal through the ridge an *equal depth*, and let the flood waters go on to the ocean. This would cost but little, compared to the vast benefits to all above, and with *no injury to those below*. The east embankment of the canal should be amply large to reclaim Judge Garute's land; the west bank of canal should be very slight, for if it should break, it would do but little harm, as it would soon run back into the *lower* canal or drain to the low tules. My recommendations for lower river and bay improvements should be borne by the United States Government, and undoubtedly will be favorably reported upon by the distinguished Board of United States Engineers.

If rights of way could not be cheaply secured, a law should be passed to condemn land and to cut through such obstructions. This law, although necessarily a general law, need not be an expensive one. It should provide for three commissioners, to be appointed by the governor, as their duties would be light, and as some of the *best* commission service the state gets it gets without pay. This commission or board of public works should only receive expenses not to exceed fifty dollars per month, with power to appoint an engineer at three thousand dollars and a clerk at fifteen hundred dollars per annum; the state engineer's office should be merged into this office, or if its time of usefulness is ended, it should be discontinued.

This law should confine each district to *one side only* of a *navigable stream*, and should *prohibit* the formation of more than one trough in one district, for the reason that there is a great difference whether a set of troughs or ponds have *mountains* for *one side* and a *high river bank* for *the other*, like Colusa and Yolo Basins, or, like the east sides of Butte and Sutter Basins, which lie *between two rivers*, have different interests and need different treatment, for the west sides need the *only canal to be made* under this state law in this section of the state.

A canal on the *east* side could do no good in carrying water to the bay, unless it runs *across* the Sacramento River, thereby destroying its present great usefulness for transportation and drainage. It was once so recommended by a state commission, and the present leading River Improvement Committeemen have made recommendations to cut into this great waterway, which, under *no pretense*, *should be allowed* by these schemers, who have been such monstrous failures in the past, and who now wish to lead in other expenditures of other millions more, again, for private gain.

L. F. Moulton.

Colusa, Jan. 1, 1891.

FOLLIES OF THE PAST.

Pretended reclamation, or brush and other swindling dams, one of which was built across the east side of the Sacramento River trough by Parks, costing me ten years of litigation and twenty thousand dollars to only partly remove; and a dam on west side, built by Reed, in addition to the Knights Landing ridge, together with Parks' hydraulic brush dams, which cost the state millions, and other errors, have especially allowed the *floating sands and pipe clay* to fill up our *rivers and bays* and form bars across the *only good harbor on our western border* and destroy the *channel* for our new *Charleston*, and other war vessels disabled in battle, to run to our only (once) good harbor and navy yard at Mare Island, which lately *imprisoned a French warship, until released by an exceptionally high tide*. Our national government, which improves instead of allowing rivers destroyed in *other states*, has been accessory to the deplorable condition of her navigable waters in this state.

Reclamation drainage, tide gates at Prospect Slough, and levee on north bank of Steamboat Slough, with tide gates through the same to drain off four feet of the vast basin above, with jetties on south to turn waters gradually into the river, and thereby dredge the river channel below, together with helping to dredge out hydraulic deposits above in Steamboat Slough, are needed.

Only one drainage canal is needed, and that on the west side of Sacramento River. Any canal on

east side of river, or on any basin or trough, could not be found in flood time with a *sixteen-foot pole*.

Remove all possible obstructions and facilitate the escape of flood waters, instead of filling the river with hydraulic *sand* and *dams*.

Follies of Reclamation.

Having been deeply interested since 1852 in the valleys of the Sacramento and its tributaries, I have made their protection and improvement a constant study.

For thirty-seven years I have thought, talked, and written numerous letters and pamphlets on this vital subject; also, I have prepared a great number of elaborate and costly maps, and have distributed them free and taken care to keep them in public places. I have bought a steam engine, type, and machinery, and have printed free supplements by the hundreds of thousands, paid expenses of paper, printing, and expressage to sixty-seven newspapers of the state. I have made many surveys; run many lines of levels for levees, canals, etc., which have been utilized by the Surveyor-General and the State Engineer; and made thirty miles of good levees.

I went down to run the levels across the Montezuma Hills with Mr. Egbert, but we procured another to run them. On my way home, I run a line of levels from Yolo and Colusa pond, one-fourth mile across ridge, at Knights Landing. I found that over six feet could be drained (and at that time the river was only one foot below high-water mark) from the upper pond, and that this would raise the lower pond but a few inches and that *only while the water was passing through* the ridge at Knights Landing. These six feet, later on, when lower, which Cache or Putah Creek Basin should have drained off, could be drained to

fifteen feet. This would drain the entire trough on the west side of the Sacramento River in time to raise many different and valuable crops that season, instead of the water being *penned* up, to breed sickness, death, and financial ruin to the owners.

From these and other examinations, I concluded that the right thing to do was to commence at Semple Bend, on the west side of the Sacramento River, three miles above Colusa, leaving, through a substantial levee, a waste way, or I will call it a blow-off for the great floods. As these expensive levees in this natural depression break nearly every year, costing large sums of money to repair them, this overfall would let out but little water, and that for but a few days in time of highest flood, and would be safer to the district of country below, and would not fill this pen made by *bad* engineering. In order to pick up plain and hill water, north and west of this point I would make a canal, throwing all the dirt on the southeast side, and running southwesterly to west edge of trough, down to and through the ridge at Knights Landing.

Below Knights Landing, Cache and Putah Creek floods are so boisterous that it would be more difficult to control the hill and plain water, especially as the Feather River Basin water and the surplus of the Sacramento River spill over into the west-side reservoir, there to remain until too late for any kind of crops.

Again, the Feather, and especially the American Rivers, are so *steep* that they bring over into, and clog up the Sacramento River with what hydraulicers and their editors and engineers call sheep wash, and also plowed land, which overtops the levees on the Yolo side, and runs

into Yolo Basin. These, and other causes combined, would make it expensive to make a canal down to and through the Montezuma Hills. According to my original plans, a cut through these hills would cost millions, and have been estimated for a mere drain ditch as from three to seven millions of dollars. And, to be of any value, they would probably cost more than will for the present be expended on a doubtful scheme. Instead of this costly cut, which would not *elevate* any tule reservoir water, Marsden Manson recommends a short and cheaper cut, and *it* would not *elevate* the *bed* of the tules either; both would require *more fall* through the ditch than in the river itself.

Instead of the above expensive canals, I have advocated using Cache Slough, and with tide gates in a levee along the north bank of Steamboat Slough, which would drain off four feet of this vast reservoir above. It would be necessary, in order to prevent the current from running over the country to the south, to use piles, brush, and dirt, turning the water gradually down the Sacramento River, and thereby use this clear tule water to force along the sand which now choke the river. By deepening the river at this point, the water above would have an increased fall, and enough to *deepen* river above.

WINTER FLOODING

I have advocated this idea for many years, and finally read a paper before the Horticultural Society in Supreme Court room, I think in 1885 (page 286 to 290, Report of 1885-6), in which I publicly advocated, first, the leaving of overfalls in levees similar to the one above described at Semple Bend at head of west-side canal, one for

every three miles or so, on *both* sides of the river, say three feet below top of levee, each overfall to be on up-river side, above high, dry sloughs, which should pick up the waters. There should be flood gates to fill up these dry sloughs, through levees to run it out onto the surrounding country to winter flood the land. This would be sufficient water for all land, except gardens and Chili clover. Only one flooding for orchards would be necessary, if followed up by *thorough cultivation*. On the banks of these dry sloughs, slight levees should be erected, with flood gates through them, so as to let water out into the highest pens or checks, then into the next lower pen, and so on down to the trough or tule, and finally to the bay. But in most years this judicious use of what are now dangerous waters would be utilized, and would take the place of more expensive, bonded irrigation, for these ready-made little winter rivers, being themselves graded canals, made so by the laws of alluvium, would *winter* and *spring flood* the adjoining land as far as they run, and could then be used on greater flats below, and, being cold water, would not be so liable to crack certain kinds of lands not susceptible of immediate cultivation. Existing only in the winter, they would not be so apt to cause sickness, and would *never be able to injure navigation* at these high stages; but, instead, they would leave the water in the summer to help transport the hydraulicers' so-called sheep wash down to the lower river and bay.

DECLARE DRY SLOUGHS RUNNING STREAMS

Second. In this paper I also proposed to have all dry sloughs made so by the action of running water, having clearly-defined banks, and declared

by law to be *running streams*, and settlers on their banks declared to be riparian proprietors, and that any settler should have the right to demand that sloughs should run free through head gates as full as if no gates existed, but that he should only have the right to bring it onto his land, and no right to turn it onto proprietors below him. But any other settler still below could demand that it should flow to him, but not below him, and so on to end of all well-defined sloughs controlled by levees on their banks, with checks and gates as above described.

Only one relief canal or drain is needed, and that on the west side of Sacramento River, as above stated, from three miles above Colusa down to and through Knights Landing ridge. If parties at Knights Landing should object to an open cut, two arches, or even one as large as the new Croton Aqueduct, viz., thirteen by thirteen feet, two hundred feet long, with tide or stop gates, would relieve one hundred thousand acres of land above, mostly filled by hill water. This would hardly be noticed on the pond below Knights Landing, as *lower end rests against the ocean*.

Parties writing about the lower west-side canal drain have, on paper, brought it up to the *only actual obstruction*, the *ridge* at Knights Landing. They are seemingly afraid to attack a job of a few thousand dollars, one that is *absolutely necessary* to let out the *only penned-up* waters, for on the east side of the river, as of other basins and rivers to the east, they are all natural canals, already in good running order. And a canal through these other basins could not be found by a sixteen-foot pole in flood time, but should have *pipes under Sacramento River to main canal*.

Having for thirty years been writing, surveying,

and advocating my theories of reclamation and drainage, State Engineer Ham. Hall wrote and requested my views at length. In reply, I wrote and extensively distributed a pamphlet addressed to him, and I have had the satisfaction of seeing, in his report, my views sustained up to Knights Landing, but no further. Also, that other able authority, Marsden Manson, approves same course up to Knights Landing, and there stops short of opening the *only* great outlet to the upper basin. Another authority, State Commissioner Green, with Matthews and Bost, reported in favor of taking relief canal out fifteen miles above Colusa, down through *east* side trough. Last year Mr. Green saw his error, and recanted, and adopted my maps and plans above described, and the San Francisco *Chronicle* at once published his map and adopted it as a *correct* plan.

I have always claimed that we could hold water between mile-apart levees down to the Semple Bend, being the head of my west-side canal, below that point the river having much less grade and being narrower between the ancient, firm banks. The levees are now actually well made above the Semple Bend, and only need some work in places never yet completed.

On the west side, two miles below Colusa, a twenty-foot levee has slipped into the river; besides, there are several other breaks, and those where the river is running north of east for four miles, and where the river floods *used to run across* the river into Reed's pen and then down to Knights Landing ridge, where water has been in Reed's pen *four* feet higher than water in the river, the river, at the same time, being at high flood. Reed had to cut his levee to let this water out, so

as to save his house from washing into the lower basin, instead of letting the water cut out its own channel when it was running over the ridge (the ridge some three hundred yards) into the lower basin, which would have freed his pen above and saved fifty thousand acres of grain in the upper pond that year. But he built a *dam* across the lower end of his pond, and so backed water onto the settlers above.

The *Paine break*, two miles below Sacramento, which our worthy governor has so promptly called our very efficient delegations' attention to in Congress, is like the break two miles below Colusa. The river is in danger of running into Reed's and Rose's pen on the west side, the same as Paine's break is in danger of running into Yolo Tule and spreading out over the tules, and both are endangering navigation in another way, by forming a *bar below break*, which will stop steamboats. This will show to farmers above the break that many persons underestimated the value of the river; for, as an example, wheat at my warehouse would have to be hauled twenty miles across Slickens Country to railroad on the east, and twelve miles, with no ferry or bridge across the Sacramento River, to the railroad on the west.

The *Examiner*, the *Chronicle*, the *Call*, and others of our best papers have the thanks of our farmers for their great interest taken in the value of this noble river, of such inestimable value for irrigation, winter flooding, drainage, and *cheap* transportation.

When Eads, Knox, Hall, Parks, and others were at my house, I submitted to Eads, that greatest of living engineers, the problem of closing, in part, Butte Slough, providing automatic valves,

however, to allow *inflow* of outside water and fish into the river. Eads and his assistant, Colonel Andrews, agree with me that it was best to fill up the bottom of the slough with mattresses, piling, and other well-known appliances, say, to within two-thirds of the way up to the natural banks, so as to hold sufficient *clear water* in the river to carry along the sands at the spring or medium stages of water, especially as far down as to past the mouth of Feather River, to gravel bar below its mouth. And I hold as correct the same theory as regards the *Paine break*. I think that, in extremely high floods, it is safer, both for Sacramento City and the river itself, for the steep American River to have a *blow-off* for the mountains of hydraulic sand and gravel. This is the only place in the valley steep enough to allow *slickens* to be successfully and uninjuriously carried to the *tule*, thus to build up a kind of poor land.

It has been advised, especially by papers that favor Park's brush-dam scheme, that the meeting to be held at Sacramento on January 17 shall not discuss any engineering plans, but confine itself to a prayer imploring the government to *undo* what it has done. I think that no harm can be done by fair discussion. I have been fighting bad measures in the legislature for the last thirty-three years. It is well known that I was the only farmer who saw the cussedness of Park's dams, which have cost the state, and others, many millions of dollars. I opposed it in one of the largest audiences ever gathered in the assembly chamber, and combatted several of the best orators of the state—General Williams, General Hamilton, Creed Haymond, and others, besides politicians, like Parks, and engineers of great eminence. It was there that I still urged

the selection of Captain Eads to come here to help solve these great problems. After trying for three years, I had the satisfaction of getting him here, but not until after this Parks' brush-dam contract had been let. Some were so unfair as to lay the follies of this monster swindle upon Eads, that most eminent engineer, and soon succeeded in elbowing him out of the state.

This infamous measure I fought for eight weeks in the legislature, but they finally passed the bill, after I had made it somewhat less objectionable. The indications that some of the same ilk were to lead in this coming meeting—some of whom have caused more ruin than has Parks himself—made me ask, Is it possible that this is a second edition to this bad brush and stone-dam measure? After spending more money than all other private individuals together in the anti-debris fight, I have, and so have my neighbors on the east side of the river in Colusa County, been ignored, possibly the better to enable them to carry out their scheme to make a dump of our country on the east side of the river. The water drained off during the last flood in forty-eight hours, and it did good, instead of hurt, to the crops; in other words, we have *drainage* for the water, instead of a *pen* to hold water, as with Reed and Rose on the west side of the river.

Our river and upper bays are, admittedly, almost ruined by hydraulic vandalism, and by no fault of the farmers or cities in the valley. Our government overlooked the ruin to her rivers, bays, and the entrance to the only good harbor along the western border of our great nation. This harbor, so incalculably valuable in time of peace, and more especially in time of *war*, together with the

only site for a *good navy yard* on this coast, is about destroyed.

The Mare Island port, which is filled with light pipe clay, a little thicker than water and thinner than mud, imprisoned a French ship of war in the dock at that place until relieved by an exceptionally high tide.

What a misfortune that the agents of our government on this coast should not have found out that what they thought to be sheep wash and plowed land is but pipe clay and other fine sediment, which *run* over their impounding dams, to the *ruin of Mare Island Navy Yard*, and with the formation of a *bar* across the mouth of the harbor! That will, if not stopped soon destroy it for deep-draft vessels, at least. Then Irving M. Scott's genius in building great naval ships for the coast defense will be of little use.

What can the government now do to remedy the mistakes its agents have made in allowing these, the noblest of harbors and of rivers to be destroyed? Common sense replies, *Stop*, by all the power of the government, if necessary, the cause. Allow no more debris and no more brush or stone dams to be built in waters over which the government has control, or to be built anywhere in which waters are freighted with even fine debris and able to get to the rivers.

Make the works at Cache Slough, as above stated; dredge out Steamboat Slough, and put the dirt on its north bank, with tide gates in these levees and with jetties on its south bank, thus to gradually turn *clear tule* water down through the river channel, to scour out the sand below. Then work on *up* the Sacramento, bettering, widening, and deepening its channel: fill up and leave overfalls at

Paine's break and at Gray's Bend or at mouth of Feather River; partly close Butte Slough, to save clear water, and so help to wash out the river sands below; clear out the trees and snags, and dredge out the bars.

Afterwards, if found necessary to secure the foothill waters of Cache and Putah Creeks and the water from Semple Bend canal for scouring purposes, the canal could be continued around to the west edge of the lower basin to the Sacramento River at Cache Slough, especially if levees were built along the banks of the Sacramento River strong enough to hold its flood waters. But, for reasons given above, I think it would be, for the present at least, impracticable. Under no pretense should the Sacramento River be "crossed" by a canal, as formerly proposed by State Commissioners Green, Matthews, and Bost, and as now again advocated by one of the old state commissioners, for at Gray's Bend the river is very crooked, narrow, and has a very slight fall, not enough to carry heavy sand. At Gray's Bend it turns from its general south course to north of east, and seemingly runs up stream to its confluence with the very steep Feather River, the latter heavily laden with coarse sand and with gravel. Especially at this point, this very crooked reach needs all the *clear* upper Sacramento waters to help move the gravel now piled up below the mouth of Feather River. A cut-off, as shown on cover, would increase its flow.

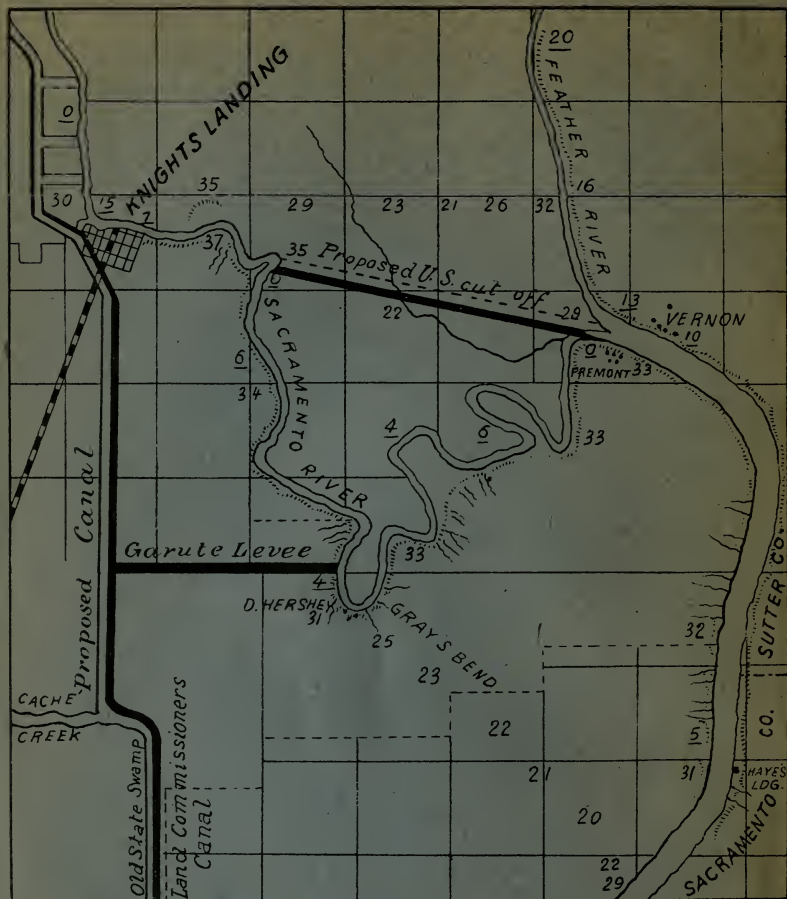
In handling this great problem, no reckless schemers, like those of the past, should be allowed to direct affairs, and especially should no engineers in sympathy with, or apologizing for, the vandalism which now causes these misfortunes, be allowed to parcel out the money. Instead, these

commissioners, like the great German commissioners, should be so high in the confidence of the people that they would be held above considerations of religion, politics, or war.

L. F. Moulton.

December, 1889.

MAP SHOWING SURVEY OF WEST SIDE DRAINAGE CANAL



Made from data in the State Engineer's Office, and being a part of very valuable matter fully reported on by that officer.

Underlined numbers along the river channels represent the average elevations of the river bed. All other numbers are ground heights at the points where written. Elevations are referred to low water in Suisun Bay. The dots, or small marks along the river, represent the line of the levees. The heavy black lines are township and range lines, and the small squares are sections